The contribution of archaeology to the study of historical disasters

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Abstract: Recently, a 'call to arms' has been issued to historians, emphasising the contribution their discipline can bring to the study of the impact of catastrophes on human society, specifically in the medieval period. This highlights the, relatively, long-term perspective and detailed analysis which a historical perspective can provide compared to focussing solely on contemporary or very recent disasters. Archaeology as a discipline is similarly well placed to approach this subject but rarely does. This paper, focussing on medieval European evidence, offers a brief review of the reasons for this hesitancy in tackling topics related to natural disasters, what archaeologists can offer in the study of past disasters and what directions future archaeological research should favour in order to increase the contribution of archaeological research to this area of scholarship.

Key words: Natural disasters, catastrophes, social responses, medieval archaeology

Introduction

A number of recent papers from prominent historians call for the inclusion of historical analysis in the study of disasters (Curtis *et al* in press; van Bavel and Curtis 2016). It is argued that the historical 'laboratory' offers an unrivalled vehicle to analyse past catastrophes, their impacts on society and the coping mechanisms that emerged to deal with the resulting environmental, economic and social challenges. Furthermore, the point is made that a historical perspective permits disasters to be considered over a much longer time span than is possible with modern day events. This allows the study of disasters to move beyond the description of contemporary catastrophes to detailed analysis of the impact of events, including floods, landslides, earthquakes, droughts and volcanic eruptions, on longer-term social and economic trajectories at both the local and regional scale (ibid: 145-146). This paper argues that these observations could, and should, be similarly applied to archaeological research which can equally contribute important and complimentary evidence and analysis to the study of disasters in the past.

A recent gathering of archaeologists identified natural hazards and extreme natural events as one of the 'grand challenges' that archaeology as a discipline should seek to tackle in the next quarter century (Kintigh 2014). Although there exist groups of both archaeologists and historians that have embraced disasters as a theme of research since at least the early 2000s (e.g. Reide 2014; Cooper and Sheets 2012; Torrence and Grattan 2002; Schenk 2003; Bankoff 2004; Mauch and Pfister 2009), these two disciplinary groupings rarely interact. A division appears to have emerged in which historians, naturally, focus research into those disasters for which documentary evidence exists while archaeologists, less understandably and often in isolation or together with natural scientists, focus overwhelmingly on prehistoric or undocumented disasters. As a result, archaeology is rarely a key contributor to research into historical disasters, a fact highlighted by some national research frameworks (Hall and Price 2012: 31). There are, of course exceptions (e.g. Gerrard and Petley 2013). The collapse of Norse Greenland, for example, and the impact of volcanism on Icelandic society have garnered significant research (e.g. Dugmore *et al* 2011; Dugmore and Vésteinsson 2012). Importantly though, a distinction must be made between gradual, long-term decline, as in the case of Norse Greenland, and the effect of rapid-onset, high-magnitude natural hazards such as floods, earthquakes and landslides, among others. The study of societal decline and collapse, compared to the related yet distinct field of disaster studies, has been approached more successfully by archaeologists (van de Noort 2013: 25-27). This may be due to the longer time spans involved which are more suited to the chronological resolution of the archaeological record, as well as the fact that a vanished society cannot produce written records, making the archaeological evidence particularly valuable.

As with other important contemporary debates, such as climate change (van de Noort 2011), the contribution of archaeology as a discipline to wider academic debates and discussions surrounding the impact of natural hazards on human societies has been lacklustre. This fact is illustrated simplistically through a search of the main disaster studies journals (Disasters, Natural Hazards, Journal of Mass Emergencies and Disasters) with the keyword 'archaeology'. Very few of the research papers returned by this method include anything more than a passing reference to archaeological evidence. This paper, focussing on medieval evidence, will review the underlying reasons for this disciplinary hesitancy, assess the important

contribution archaeology can make to this topic during historic periods and propose how this situation might be mediated.

Medieval Archaeology and Natural Disasters

Medieval archaeologists have been reticent in approaching the impact of environmental fluctuations on human communities. When, for example, a long-term decline in weather conditions was invoked as a cause of medieval settlement abandonment (Beresford 1975: 51-2), a swift rebuttal dismissed this interpretation as simplistic natural determinism (Beresford and Hurst 1971: 21; Wright 1976). This entrenched rejection of nature and environment as 'protagonists' stems from the traditional historical view, that only human actions and decisions can precipitate cultural change (Hoffman 2014: 342-351; Campbell 2010: 282-284). Although this dogma is beginning to be refined, largely as a result of recently developed scientific methods and climatic reconstructions, it remains controversial to equate changes in nature and environment with observed developments in human affairs. This received wisdom goes some way to explain why natural disasters have rarely been central research questions, especially among medieval archaeologists who are perhaps more influenced by historical trends than prehistorians.

Compared to long-term climatic change, instantaneous exogenous shocks present a different challenge. While the immediate impact of such events is undeniable and uncontroversial, there are difficulties in analysing such events from an archaeological perspective. The available chronological resolution rarely allows individual contexts and artefacts to be dated precisely beyond a date range less than c. 100 years. This poses a problem when dealing with historical disasters as it becomes difficult to convincingly demonstrate that material evidence is connected to a documented disaster (Galadini et al 2006: 408). The problem, similarly encountered when trying to mesh climatic proxy evidence with archaeological data (Cooper and Peros 2010: 1226), is that the difference in temporal scales between disciplines introduces difficulties in interpreting the data. One example is provided by the documentary evidence which records the burning of the Abbey of Strata Florida, Ceredigon, by lightning in AD 1284 (Christie 1887: 115-117). While the archaeological evidence corroborates this description, with aspects of the material remains closely matching the written description (Williams 1889: 153-154), it is impossible to definitively prove that the melted roofing lead recovered was a product of that particular blaze and not another fire, of which there are a number of possible, historically known, candidates (ibid: 154).

These chronological issues may explain to some degree why medieval archaeology has particularly engaged with disasters in Norse Iceland. Here tephra layers from volcanic eruptions provide precisely dated reference points which can be used to temporally anchor archaeological layers. This allows analysis of the material changes that took place in the aftermath of a particular eruption, with chronological evidence of their association to the hazard. This research is often conducted by, or in association with, volcanologists with primarily scientific aims but a number of studies have explicitly focussed on social impacts and consequences of disasters (Dugmore *et al* 2007: 7-8).

Archaeoseismology, the study of past earthquakes through archaeological evidence, has emerged as a distinct field of scientific enquiry. Conducted overwhelmingly with a natural science rationale, the data obtained from archaeological sites relating to past earthquakes can inform models of contemporary and future seismic risk. The value of this data for evaluating modern-day risk has, however, had an unfortunate blinkering effect meaning that archaeoseismological research rarely engages with the relationship between past societies and the seismic events they investigate. This is a short-coming recognized by archaeoseismologists themselves (Sintubin 2011: 8). An ongoing research project of Durham University seeks to redress this situation for the medieval period through investigating a number of key, medieval European, case studies (Forlin 2016).

Historical extreme weather events are usually studied primarily by historical climatologists and environmental historians. Archaeologists frequently encounter evidence for the occurrence of these events, particularly floods but also wind-blown sand (Brown 2015) and even rainstorms (Hinzen et al 2013). As with archaeoseismology, such data has been usefully applied to answer practical scientific questions, for example investigating changes in river flood regimes (Kiss and Laszlovsky 2013). Synthetic and comparative research on the impact of these events on contemporary society has, however, been similarly lacking. In the rare cases where medieval archaeologists have considered such events as a primary research topic, the focus is often on archaeological methods and they are usually published in journals which are unlikely to be read by other disciplines (e.g. Griffiths 2015). This effectively prevents interdisciplinary discussion and collaboration. Although the same accusation could be levied at this paper, its primary aim is to raise awareness within the archaeological community of the paucity of research in this area and the surrounding issues.

The Contribution of Archaeology to the study of Medieval Disasters

Although the previous section has briefly outlined the state of research and problems in a largely negative light, as alluded to there are many aspects of the study of past disasters which archaeologists can make an important contribution towards. One area in which the study of disasters can benefit from the contribution of archaeology is precise information concerning the impact of a short-term environmental shock. While historical sources often provide information about what happened during the medieval period, these rarely provide great detail and

cannot be taken at face value – often dates and details were misreported or elaborated (Brazdil 2005: 373-374; Rohr 2003: 136-137) while coverage is biased towards the literate and landed classes. Where high magnitude rapid-onset hazards such as floods, earthquakes or volcanoes cause the destruction of a site this can often promote the long-term preservation of in-situ remains. Several medieval case studies are known. One of the most fully investigated is the case of the castle of Saranda Kolones, Paphos, Cyprus, where, during the 1222 earthquake, as the structure collapsed, it is likely that most of the inhabitants made a hasty escape leaving behind objects of value as they fled (Rosser 2004: 39-40). Remains of an unfortunate individual who perished after escaping down a latrine shaft only to find his only exit blocked indicate at least one human casualty (Rosser 1986: 47), with faunal remains crushed beneath fallen masonry attesting to further losses (Megaw 1957: 49). In the aftermath of the earthquake the archaeological evidence suggests salvage attempts either to recover the bodies of casualties or to claim and reuse the fallen masonry for the repair of the town of Paphos, which had also suffered severe damage during the earthquake (Rosser 2004: 47-48). Evidence from a nearby cave may indicate the presence of refugees made homeless following the earthquake (Rosser 1985: 94) while newly built structures suggest attempts to remedy this situation by constructing new housing in the earthquake's aftermath (ibid). Such an example demonstrates the rich level of detail that archaeology can lend to an event which, although documented to some degree – the earthquake itself was recorded but little mention was made of the castle – would otherwise be unknown.

Demographic and economic changes can also be investigated through archaeological evidence. While medieval chroniclers frequently record the number of casualties killed by a natural hazard, e.g. 50,000 in a flood in the Netherlands (Pertz 1861: 215), these are rarely believable and cannot be trusted. Although as above, in rare but spectacular cases, archaeological evidence can confirm the presence of casualties, it is impossible to quantify exact numbers in any given event. Over a longer time-span however, demographic decline can be inferred from material remains. Systematic test-pitting in eastern England, for example, provides material evidence for the acute decline which followed the Black Death allowing an estimate of the percentage of demographic change in the studied locales (Lewis 2016). This approach could theoretically be applied to landscapes or settlements affected by hazards which impact a wide area, such as tephra falls, landslides or aeolian sand inundations, in order to gauge what, if any, impact these hazards had on demography and economic activity.

The latter was not always negatively impacted by natural hazards. As an example, archaeological excavations at Vila Franca do Campo, Sao Miguel, reveal that in the relatively newly settled Portuguese Azores, a devastating landslide in 1522 invigorated the economy by forcing the surviving local population to produce their own roof tiles, which had previously all been imported from mainland Portugal (Forlin and Gerrard *forthcoming*). Comparison of the layout of structures before and after disasters can also demonstrate whether rebuilding was planned centrally or if individuals were forced to make repairs themselves. The latter is demonstrated in the aftermath of conflagrations in medieval Bergen by the permanence of property boundaries, suggesting individual property, and thus the responsibility to repair the damage, were unaffected by the repeated fires which razed the town to the ground (Hansen 2015: 170).

The archaeological record can also provide evidence for ritual activity related to the fear of natural hazards. Although ritual and belief are notoriously difficult to infer through material remains alone, a number of practices can be connected to beliefs surrounding disasters. For example, one interpretation of burnt marks in churches and vernacular architecture is that they were believed to bestow protection on the structure from lightning (Lloyd *et al.* 2001). Similarly, the distribution of *ampullae*, vessels obtained through pilgrimage containing dust, holy water or oil blessed at the shrine of a saint, in agricultural fields across medieval England has been interpreted as evidence for belief in the ability of the Saints to protect against extreme natural events such as hail and drought (Anderson 2010). This type of evidence can be profitably combined with the historical record which, for medieval Europe, is rife with descriptions of processions, prayers and ritual acts which were believed to provide communal or personal protection against natural hazards (Hanska 2002).

Another key area in which archaeology can make a contribution is through a comparative approach. Van Bavel and Curtis (2016: 154-156) highlight the comparison of areas affected contemporaneously by the same hazard(s) as the most effective way to analyse the different ways in which societies approached disaster. This is an approach adopted recently by historians (Bankoff 2013). Although geographically close, social organisation and the role of institutions can vary markedly between two regions. These divergences can greatly influence the mode of recovery adopted following the occurrence of a natural hazard. Due to the chronological issues highlighted above, it is usually not possible to definitively prove that archaeological evidence relating to a hazard at two geographically separate sites occurred contemporaneously. For example, flood levels at Hastings, Sussex and New Romney, Kent have both been related to the extreme floods recorded by contemporary chroniclers in AD 1287/88 (Vahey 1989 2-3; Draper and Meddens 2009: 59-69). Similarly, late 13th/early 14th century flood layers have been detected at King's Lynn and Wisbech (Clarke and Carter 1977: 63; Hinman and Popescu 2012: 24) – areas also mentioned in the documentary evidence which records these flood events (Luard 1869: 495). In these cases, while all the evidence fits with this attribution some doubt must remain as the chronology, constrained only loosely by ceramics, could also be explained by multiple or singular, earlier or later floods, which could be documented (Gottschalk 1971: 271-

272) or undocumented events. Despite these chronological issues, all these towns were demonstrably affected by flooding during the late 13th/early 14th centuries and a comparison of the similarities and differences in the evidence for post-flood reorganisation may still shed light on the varying ways medieval society coped with such events in different locations over a short time interval. In this way the archaeological record can still make a contribution to the comparative analysis of settlements and communities affected by extreme natural events. Future studies should seek to compare the effects of a hazard on multiple settlements or sites, preferably from more than one regional context.

Discussion and Conclusions

This paper has not sought to promote the contribution of archaeology above that of other disciplines. Nor does it aim to discourage physical scientific work into the occurrences of historical hazards. The archaeological record does not hold all of the answers and there are difficulties in interpreting much of the available evidence. However, archaeology offers many additional elements and strands of evidence which can complement and embellish historical narratives as well as scientific work on the physical mechanics of natural hazards. This permits a fuller understanding of the impacts of disasters on past populations. Where possible, future studies should aim to include archaeological evidence which in particular can shed light on the short-term impact of the event, social and ritual reactions and demographic and economic impacts. Additionally, comparative analysis of contemporary or near contemporary sites, settlements and populations affected by the same hazard(s) may provide a better understanding of the factors which influenced why specific responses were adopted in certain areas. This holistic approach has so far been lacking from within the archaeological literature on disasters. Engagement with such issues will allow archaeology to interact constructively with historical research into disasters and contribute more fully to the discipline of disaster studies. Hopefully, this will permit a more nuanced exploration of past catastrophes than is currently the case.

Importantly though, it must be remembered that the most convincing narratives and revealing research in this field are possible only through an interdisciplinary approach combining archaeological, historical and scientific lines of enquiry. It is, therefore, hoped that this paper has served to demonstrate that archaeology offers a valuable and underexploited strand of enquiry which may, along with other lines of evidence from different disciplines, serve to augment and enhance the study of historical disasters.

Anderson, William "Blessing the Fields? A Study of Late-medieval Ampullae from England and Wales," *Medieval Archaeolgy* 54 (2010): 182-203.

Bankoff, Greg "Time is of the Essence: Diasters, Vulnerability and History," *International Journal of Mass Emergencies and Disasters* 22, no. 3 (2004): 23-42.

Bankoff, Greg "The 'English Lowlands' and the North Sea Basin System: A History of Shared Risk," Environment and History 19 (2013): 3-37.

Beresford, Guy *The medieval clay-land village: Excavations at Goltho and Barton Blount, SMA Monograph No. 6*, London: The Society for Medieval Archaeology, 1975.

Beresford, Maurice and Hurst, John G. *Deserted Medieval Villages*, London: Lutterworth Press 1971.

Brázdil, Rudolf, Pfister, Christian, Wanner, Heinz, von Storch, Hans and Luterbacher, Jürg "Historical Climatology in Europe – The State of the Art,", *Climate Change* 70 (2005): 363-430.

Brown, Peter "Coasts of Catastrophe? The incidence and impact of aeolian sand on British medieval coastal communities," *European Journal of Post Classical Archaeologies* 5 (2015): 127-148.

Campbell, Bruce M. S. "Nature as historical protagonist: environment and society in pre-industrial England," *Economic History Review* 63, no. 2 (2010): 281-314.

Christie, Richard C. (ed.) *Annales Cestrienses: or Chronicle of the Abbey of S. Werburg, at Chester*, London: The Record Society 1887.

Clarke, Helen and Carter, Alan *Excavations in King's Lynn 1963-1970. Society for Medieval Archaeology Monograph No. 7*, London: Society for Medieval Archaeology, 1977.

Cooper, Jago and Peros, Matthew "The archaeology of climate change in the Caribbean," *Journal of Archaeological Science* 37 (2010): 1226-1232.

Cooper, Jago and Sheets, Payson (eds.) *Surviving Sudden Environmental Change*, Colorado: University Press of Colorado, 2012.

Curtis, Daniel R., Soens, Tim and van Bavel, Bas "History and the Social Sciences: Shock Therapy with Medieval Economic History as the Patient," *Soc Sci Hist* (in press).

Draper, Gillian and Meddens, Frank *The Sea and the Marsh: The Medieval Cinque Port of New Romney*. Pre-Construct Archaoelogy Monograph No. 10, London: Pre-Construct Archaeology Limited, 2009.

Dugmore, Andrew J., Church, Mike J., Mairs, Kerry-Anne, McGovern, Thomas H., Perdikaris, Sophia and Vésteinsson, Orri "Abandoned Farms, Volcanic Impacts, and Woodland Management: Revisiting Þjórsárdalur, the "Pompeii of Iceland," *Arctic Anthropology* 44, no. 1 (2007): 1-11.

Dugmore, Andrew J., McGovern, Thomas H., Vésteinsson, Orri, Arneborg, Jette Streeter, Richard and Keller, Christian "Cultural adaptation, compounding vulnerabilities and conjunctures in Norse Greenland," *Proceedings of the National Academy of Sciences* 109, no. 10 (2011): 3658-3663.

Dugmore, Andrew J. and Vésteinsson, Orri "Black Sun, High Flame, and Flood: Volcanic Hazards in Iceland" in *Surviving Sudden Environmental Change*, edited by Jago Cooper and Payson Sheets, 67-90. Colorado: University Press of Colorado, 2012.

Forlin, Paolo "The ARMEDEA Project" (Online) Available at: https://armedea.wordpress.com/ [Accessed 31/07/2016].

Galadini, Fabrizio, Hinzen, Klaus G. and Stiros, Stathis "Archaeoseismology: Methodological issues and procedure," *Journal of Seismology* 10 (2006): 395-414.

Gerrard, Christopher M. and Petley, David N. "A risk society? Environmental hazards, risk and resilience in the later Middle Ages in Europe," *Natural Hazards* 69, no. 1 (2013): 1051-1079.

Gottschalk, Elizabeth M. K. *Stormvloeden en rivieroverstromingen in Nederland, I, de periode vóór 1400*, Assen: Van Gorcum 1971.

Griffiths, David "Medieval Coastal Sand Inundation in Britain and Ireland," *Medieval Archaeology* 59 (2015): 103-121.

Hall, Mark and Price, N (eds.) Medieval Scotland: A Future for its Past, ScARF Summary Medieval Document, 2012 (Online) Available at: http://www.scottishheritagehub.com/sites/default/files/ [Accessed 25/07/2016]

Hansen, Gitte "After the Town Burned! Use and Reuse of Iron and Building Timber in a Medieval Town" in *Nordic Middle Ages – Artefacts, Landscapes and Society. Essays in Honour of Ingvild Øye on her 70th Birthday*, edited by Irene Baug, Janicke Larsen and Sigrid M. Samset, 159-174. Bergen: University of Bergen, 2015.

Hanska, Jussi *Strategies of Sanity and Survival: Religious Responses to Natural Disasters in the Middle Ages*, Helsinki: Finnish Literature Society, 2002.

Hinman, Mark and Popescu, Elizabeth *Extraordinary Inundations of the Sea: Excavations at Market Mews, Wisbech, Cambridgeshire, East Anglian Archaeology Report 142*, Bar Hill: Oxford Archaeology East, 2012.

Hinzen, Klaus G., Schreiber, Stephan, Fleischer, Claus, Reamer, Sharon K. and Wiosna, Isabel "Archaeoseismic study of damage in Roman and Medieval structures in the center of Cologne, Germany," *Journal of Seismology* 17, no. 2 (2013): 399-424.

Hoffman, Richard C. *An Environmental History of Europe*, Cambridge: Cambridge University Press, 2014.

Kintigh, Keith W., Altschul, Jeffery H., Beaudry, Mary C., Drennan, Robert D., Kinzig, Ann P., Kohler, Timothy A., Limp, Frederick, Maschner, Herbert, D. G., Michener, William K., Pauketat, Timothy R., Peregrine, Peter, Sabloff, Jeremy A., Wilkinson, Tony J., Wright, Henry T. and Zeder, Melinda A. "Grand Challenges for Archaeology," *American Antiquity* 79, no. 1 (2014): 5-24

Kiss, Andrea and Laszlovszky, József "14th - 16th Century Danube floods and long-term water-level changes in archaeological and sedimentary evidence in the western and central Carpathian Basin: An overview with documentary comparison," *Journal of Environmental Geography* 6, no. 3-4 (2013): 1-11.

Lewis, Carenza "Disaster recovery? New archaeological evidence from eastern England for the impact of the 'calamitous' 14th century," *Antiquity* 90 (2016): 777-797.

Lloyd, Virginia, Dean, John, and Westwood, Jennifer "Burn marks as evidence of apotropaic practices in houses, farm buildings and churches in Post-Medieval East Anglia" in *A Permeability of Boundaries? New Approaches to the Archaeology of Art, Religion and Folklore*, edited by Wallis, Robert and Lymer, Kenneth 57-70. Oxford: British Archaeological Reports, 2001.

Luard, Henry R. (ed.) *Annales Monastici, Volume IV*. London: HM Stationery Office, 1869.

Mauch, Christof, and Pfister, Christian (eds.) Natural Disasters, Cultural Responses: Case studies toward a global environmental history, Lanham: Lexington Books, 2009.

Megaw, Arthur H. S. "Archaeology in Cyprus, 1957," *Archaeological Reports (The Society for the Promotion of Hellenic Studies)* 4 (1957): 43-50.

Pertz, George Henry, (ed.) Monumenta Germaniae Historica, Annales aevi Suevici, Tomus XVII, Impensis Bibliopolii Avlici Hahniani: Hanover, 1861.

Reide, Felix "Towards a science of past disasters," *Natural Hazards* 71, no. 1 (2014): 335-362.

Rohr, Christian "Man and Natural Disaster in the Late Middle Ages: The Earthquake in Carinthia and Northern Italy on 25 January 1348 and its Perception," *Environment and History* 9 (2003): 127-149.

Rosser, John "Excavations at Saranda Kolones, Paphos, Cyprus, 1981-1983," *Dumbarton Oaks Papers* 39 (1985): 81-97.

Rosser, John "Crusader Castles of Cyprus," *Archaeology*, 39, no. 4 (1986): 40-47.

Rosser, John "Archaeological and literary evidence for the destruction of "Saranda Kolones" in 1222," *Cyprus Research Centre Annual Review*, 30 (2004): 39-50.

Schenk, Gerrit J. "Historical Disaster Research. State of Research, Concepts, Methods and Case Studies," *Historical Social Research/Historiche Sozialforschung* 32, no. 3 (2007): 9-31.

Sintubin, Manuel "Archaeoseismology: Past, present and future," *Quaternary International* 242 (2011): 4-10.

Torrence, Robin and Grattan, John (eds.) *Natural Disasters and Cultural Change*, London and New York: Routledge, 2002.

Vahey, Zoe *Maidenhead Hastings 1987 an excavation report*. Hastings: Hastings Area Archaeological Research Group, 1989.

van Bavel, Bas, and Curtis, Daniel "Better Understanding Disasters by Better Using History: Systematically Using the Historical Record as One Way to Advance Research into Disasters," *International Journal of Mass Emergency Disasters* 34, no. 1 (2016): 143-169.

van de Noort, Robert "Conceptualising climate change archaeology," *Antiquity* 85 (2011): 1039-1048.

van de Noort, Robert *Climate Change Archaeology Building Resilience from Research in the World's Coastal Wetlands*, Oxford: Oxford University Press, 2013.

Williams, Stephen W. *The Cistercian Abbey of Strata Florida: its history, and an account of the recent excavations made on its site*, London: Whiting and Co., 1889.

Wright, Susan M. "Barton Blount: climatic or economic change?" *Medieval Archaeology* 20 (1976): 148-152.